

The Impact of Eco-gamification on Sustainable Tourist Behaviour: The Mediating Role of Word of Mouth

Abstract

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This study aims to measure the impact of eco-gamification on sustainable tourist behaviour. Gamification is considered one of the modern and innovative trends in the field of information technology. An integrative model was developed to explore the impact of eco-gamification on sustainable tourist behaviour, through the mediating role of word of mouth. Using Warp pls 7, data collected from 344 Arab and foreign tourists who visited Egypt were analyzed. The study found that there is a direct relationship between eco-gamification and sustainable tourist behaviour. The results also showed that the word of mouth partially mediated the relationship between eco-gamification and the sustainability of tourist behaviour. Moreover, the study provided a set of recommendations for decision-makers in the tourist destinations and for experts in the technology field to design specific visual environmental games including information about the tourist destinations. They can help in maintaining sustainable development through influencing tourists' behaviour, as well as attracting tourists via using the gamification system. Furthermore, attention should be paid to the users' word of mouth regarding the environmental games because it has a major role in conveying their positive experience to others, which works to shape sustainable behaviour.

Keywords: Eco-gamification, sustainability, tourist behaviour, word of mouth

How to cite this article: Mahmoud, E.N., Maher, A. & Al-Azab, M.R. (2024). The Impact of Eco-gamification on Sustainable Tourist Behaviour: The Mediating Role of Word of Mouth. African Journal of Hospitality, Tourism and Leisure, 13(3):604-614. DOI: <https://doi.org/10.46222/ajhtl.19770720.545>

Introduction

Many business companies and commercial institutions are able to complete their work promptly with high productivity using information technology, which has become a necessary means for achieving their goals and meeting urgent local and global needs (Xu, 2013b). Gamification is one of the most distinctive communications technologies (Burke, 2014). It has been used in recent years to motivate individuals and groups and direct them towards various behaviours (Matallaoui et al., 2017; Hamari & Koivisto, 2015) check references. Today's digital comes in many forms, applications, and types (McGonagall, 2011) that most of the world's population accepts; and they are overwhelming at all times and places, at work, and even during travelling (Robson et al., 2015). Gamification is defined as the use of game design elements in contexts and fields other than gaming (Deterding et al., 2011a; Dymek & Zackariasson, 2017) for many goals, ranging from increasing brand awareness and marketing to encouraging customer engagement (Lucassen and Jansen, 2014; Xu et al., 2013). It is a future trend that has been applied in tourism in many ways in order to demonstrate motivation, change behaviour, improve performance and customer satisfaction, increase loyalty and participation, and provide a wonderful tourist experience for tourists and visitors (Xu et al., 2013). The World Travel Market (WTM) (2011) reported that gamification will be the main trend for the coming years in tourism attracting customers of all ages, especially with the tremendous development in smartphones and the increased use of the Internet (Zeroual et al., 2017). The concept of gamification depends mainly on the forms or means that it can take in order to design games for fun and motivation using game elements to create value for stakeholders (Savignac, 2017). Many researchers have indicated that implementing game elements and mechanisms leads to improving the individual's self-esteem by meeting the users' psychological needs, such as independence, competence, and relatedness, since the success and effectiveness of gamification depends on motivation (Swacha & Ittermann, 2017).

It is worth noting that the majority of individuals confuse gamification with rewards programs and video games and consider them the same thing. In fact, they are similar in some aspects while they differ in others. Both of them include individuals' voluntary participation and the use of game mechanics, such as points and levels, interaction, and progress to move to the higher level. However, gamification directs individuals to the right path and engage them on an emotional level to motivate them, which is unlike video games that mainly focus on entertainment and transactional rewards programs that attract individuals to compensate them (Burke, 2014). In the context of sustainable tourism, gamification can act as an interface between tourists (customers), institutions (companies, NGOs, and public institutions) and society, built in a responsible and ethical manner. The aim is to identify gamification techniques and applications used by organizations in the hospitality and tourism industry to improve the sustainability of tourism activities. The relationship between tourism and the environment represents one of the main topics for tourism stakeholders who recognize its importance focusing on two approaches. First, environmentally friendly tourism is an approach concerned with reducing environmental impacts and increasing sustainability. Second, environment-based tourism is an approach where the environment represents one of the main inputs to tourism, and must be preserved in order to ensure long-term success (Aall, 2014; Stefanica, 2015). Therefore, gamification can be used as a tool to direct tourist behaviour towards sustainability since the purpose of some games goes beyond entertainment, and contributes to raising awareness. In other words, gamification is a strategy that can positively engage individuals in changing behaviour. In addition, the word of mouth plays a major role in conveying a positive image of the tourist destination and in changing the behaviour of individuals. Moreover, it can mediate the relationship between eco-gamification and sustainable



tourist behaviour. When a tourist plays a specific ecogame, he shares his opinion about this game with his friends and relatives, orally, about its importance and how it helped him improve his behaviour regarding preserving the environment. The behaviour of these individuals can be changed; and they practice habits that contribute to preserving the environment, saving energy, doing recycling work, etc (Fan, 2013). Therefore, we focus, in this study, on clarifying the role eco-gamification plays in directing tourist behaviour towards sustainability. Moreover, the study aims to identify the nature of the word of mouth and its mediating role in the relationship between eco-gamification and sustainable tourist behaviour.

Literature review

Eco-gamification

Deterding et al. (2011) defined gamification as the integration of game mechanics into a non-gaming environment in order to give it a game-like character. The primary purpose of designing and implementing gamification in various types of services or applications (customer-oriented applications and online services) is to increase customers' interaction, enjoyment, and loyalty. Eco-gamification (green gamification) is a new trend in technology; it refers to the use of game elements and principles to encourage environmentally sustainable behaviour in service systems (Hennessy et al., 2012). The use of eco-gamification has shown to be effective in shaping sustainable behaviour since it motivates individuals to engage in pro-environmental actions through rewards and competition (Aguiar-Castillo, 2019). Moreover, eco-gamification can be implemented in various service systems, such as transportation, energy consumption, and waste management (Souza & de Vasconcelos, 2022). It has the potential to significantly impact the sustainability of service systems and encourage individuals to adopt more environmentally friendly behaviours. Thus, it is important for businesses and organizations to consider the use of eco-gamification in their operations as a way to promote sustainability and drive positive change (Sesliokuyucu, 2022).

Negrusa et al. (2015) and Sigala (2015) indicated that environmental gamification is the use of game design elements and mechanics in non-game contexts, with the aim of promoting sustainable behaviour and encouraging customers to engage in environmentally friendly businesses. Service systems are often based on customer participation. They engage them in order to work effectively. Through environmental gamification, service providers can motivate customers to adopt more environmentally friendly actions. Additionally, environmental gamification can be defined as a way to educate and raise awareness about environmental issues by introducing sustainability programs into games, where service providers can make the topic more accessible and attractive, to a broader audience (Souza et al., 2020). This can help build a sense of community and common purpose among customers since they work together to achieve a common goal of realizing sustainability and promoting environmentally friendly behaviours (Aguiar-Castillo et al., 2019). Deterding et al. (2011) also defined it as the use of game design elements and mechanisms in non-game contexts to engage people and motivate them to achieve specific goals related to the environment and preserving it, and to raise awareness about environmental sustainability issues. Souza and de Vasconcelos (2022) stated that green gamification is a specific type of gamification that aims to promote sustainable behaviour; and by embodying environmentally friendly actions, service providers can motivate customers to adopt more sustainable habits.

The importance of gamification in tourism

Gamification has considerable importance in the tourism field. It encourages tourists' participation and influences their behaviour (Jennett et al., 2008). Participation is considered one of the dimensions of the game experience, which can be related to multiple concepts such as flow, motivation, enjoyment, immersion, enjoyment, and presence; enjoying the game and continuing to play it leads to the individual's attachment to it (Brown and Vaughan, 2009). Participation is also closely linked to increasing customer satisfaction (Linder, 2013). Furthermore, gamification has a significant impact on tourists' behaviour, actions, and purchase decision through constantly motivating and rewarding them (Robson et al., 2016). Moreover, gamification enhances tourism expertise and experiences since tourism, as an experience-based economy, provides a multi-dimensional and multi-faceted presentation of experiences (Kim et al., 2012). Creating unforgettable experiences and expertise represents an important basis for tourism; and technological applications have enhanced tourism experiences and expertise (Postel, 2017). Besides, gamification contributes to strengthening and increasing tourist loyalty since loyalty programs can support strategic goals in marketing tourism relationships (Campon et al., 2013) based on quality, value, and satisfaction (Oh, 1999; Petric, 2004). It also increases tourism brand awareness. There are two types of gamification currently used in the tourism industry: first, online/offline games, which are mainly used to raise brand awareness to attract potential customers and build a positive image of the tourist destinations; second: location-based mobile games, which are used to encourage participation in the site and enhance tourists' experience at the tourist destination in an enjoyable and interactive media way (Xu et al., 2013b). Tourists spend a long time in front of the gamification program. This increases their engagement with the brand, affects their prompt purchasing decisions, helps in obtaining data and information, since gamification provides many statistics and data about current and targeted customers, and facilitates evaluating the performance of promotional and marketing campaigns, through points system, competition, and interactive activities, providing support opportunities for marketing research (Daisyme, 2017).

Tourist behaviour sustainability

Consumer behaviour can be defined as the dynamic interaction of affect and cognition, behaviour, and the environment by which human beings conduct the exchange aspects of their lives (Schutte & Chauke, 2022). Sustainability is a set of actions that aim to protect the social and material resources of the planet (Corral et al., 2010). Sustainable behaviour in scientific terms is synonymous with "pro-environmental behaviour". However, the latter term is used to emphasize the efforts exerted to protect the natural environment, while the first term defines the actions aimed to protect both the natural and human (social)



environment. Therefore, it is preferable to use the term sustainable behaviour since it is considered purposeful and effective. This behaviour is also proactive since it considers the needs of the future generations and simultaneously satisfy the current needs (Bonnes & Bonaiuto, 2002). Since sustainable development demands the effective protection of natural resources while meeting the needs of people at the same time, preserving human resources (society, culture, individual survival, and well-being) is as important as preserving ecosystems; thus, it has been suggested to include pro-environmental, frugal, altruistic, and just actions as examples of sustainable behaviour (Corral et al., 2010).

Word of mouth

The word of mouth is the informal communication carried out by consumers to inform others about the qualities of some goods and services (Ahmadi, 2019). It can be positive or negative feedback on a service a customer used and then conveyed to another person (Lovelock & Wright, 2002). Moreover, it takes place between consumers to help evaluate products and services, make decisions, and reduce risks related to purchasing (Roy & Naidoo, 2017). Communication with the spoken word is considered an influential factor in the consumer's perception of the quality of the service or product; however, the problem lies in the difficulty to control it due to the independence of the person transmitting the word (Stern, 1994). The means of communication through the spoken word is unpaid (Lang & Hyde, 2013). The consumer's reaction to the word of mouth depends on his personal experience, and ability to form service expectations (Davis & Jones, 1979). Spoken word communications carry a certain weight as a source of information because it is perceived as being unbiased (Zeithmal et al., 2006).

The study's hypotheses development

Eco-gamification and sustainable tourist behaviour

Eco-gamification has a major role in directing tourists' behaviour, influencing them, and changing their behaviour towards sustainability. By formulating tasks and goals in the form of games, tourism service providers can make them more fun and attractive to customers, which works to increase their participation and motivation towards sustainable behaviours (Kim et al., 2021). Environmental gamification is also considered a means of educating customers and increasing their awareness about specific issues, such as environmental sustainability, via using game design elements to communicate information and build a sense of belonging to the community (Souza et al., 2020). There are also applications that promote social responsibility and tourists' engagement with host communities and educate tourists about the appropriate use of recycling infrastructure; these examples show how environmental gamification has grown, and illustrate the extent of its acceptance and ability to expand (Weber, 2014). Thus, gamification is effective for promoting sustainable behaviours, as well as raising awareness of environmental issues. Gamification is a tool used to achieve sustainable development goals, especially with regard to sustainable cities and communities, promote responsible production and consumption, and influence tourists' behaviour directing it towards sustainability and environmental preservation (Jones et al., 2017). In the same context, eco-gamification encourages individuals to accept behaviour change and helps to educate them about matters of sustainability and biodiversity (Wee and Choong, 2019; Ali et al., 2020). Playing games can increase visitors' awareness of environmental resources in terms of responsible use and encourage them to adopt new habits. A destination has a positive reputation based on tourist satisfaction; and the intrinsic incentives gamification provides to tourists help promoting their ethical behaviour towards the environment (Negrus et al., 2015). For example, the WasteApp application was developed to inform travelers about waste areas in European cities. When users obtain sufficient points, the award is determined, the request is processed, and the reward is received. The objectives of this application focus on the implicit reward, contributing to the sustainability of the place visited through scoring points, and, then, achieving the reward (Hunicke et al., 2004). Based on the above, the first hypothesis is as follows:

H1: "eco-gamification positively affects the sustainable tourist behaviour"

Word of mouth and sustainable tourist behaviour

WOM in various studies can influence consumer behaviour, purchasing decisions, and brand reputation. Positive e-WOM can increase customer loyalty and attract new customers, while negative eWOM can damage brand reputation and decrease sales (Sanggramasari et al., 2023). Elsaid and Sayed (2022) believed that there is a relationship between the word of mouth and the sustainability of tourist behaviour. This study highlights the importance of consumers' behaviours in relation to information as well as the characteristics of this information. Several works studied the effect of "green" practices on the intention of disseminating a positive word of mouth (WOM) by hotel guests. Their results revealed that certain environmental practices, such as the use of energy-saving lighting, soap and shampoo dispensers, and recycling policies, have a direct and positive impact on WOM (Lee & Heo, 2009; Han & kim, 2010; Gao & Mattila, 2014). In accordance with these results, environmental initiatives conducted by hotel companies will probably encourage customers to spread a positive word of mouth (Lee et al., 2011). Based on the above, the second hypothesis is developed as follows:

H2: "The word of mouth positively affects the sustainable tourist behaviour"

Eco-gamification and word of mouth

Tourists play a special green game and, through the spoken word (informal communication), they are followed by others to try it; this word of mouth can also influence other people regarding the environment (Castillo et al., 2023). A good image with respect to certain environmental tourist destinations as described by WOM information can promote specific related tourist

products more successfully by incorporating the views of past and experience visitors which are credible trustworthy and of quality information about a certain tourist location (Alsheikh et al., 2021). Thus, based on the above, the following assumption is proposed:

H3: "There is a statistically significant relationship between eco-gamification and word of mouth"

Word of mouth mediates the relationship between eco-gamification and sustainable tourist behaviour

Eco-gamification contributes to motivating and retaining tourists; it also helps visitors see beyond their well-being and take the necessary actions to achieve sustainability in the tourist destination (Souza et al., 2020). Gamification techniques can enhance feelings of altruism through external and internal motivators, outreach, and social recommendations (Silva et al., 2013). Tourists develop this behaviour because they get benefits in return, providing a positive image of the destination to their contacts, through the word of mouth, which includes recommending services or products to others, and a positive confirmation that improves customers' sense of satisfaction and loyalty (Castillo et al., 2023). Additionally, gamification mechanisms pursue increasing customer engagement, encouraging specific user behaviours, including features and rules, creating a comfortable situation by ensuring quality, and attracting new users via promoting personal communication through the powerful spoken word (Chen et al., 2017). Based on the above, the following hypothesis is presented:

H4: "word of mouth mediates the relationship between eco-gamification and sustainable tourist behaviour"

Based on the above review of the relationship between the research variables, the study model can be presented as shown in Figure 1.

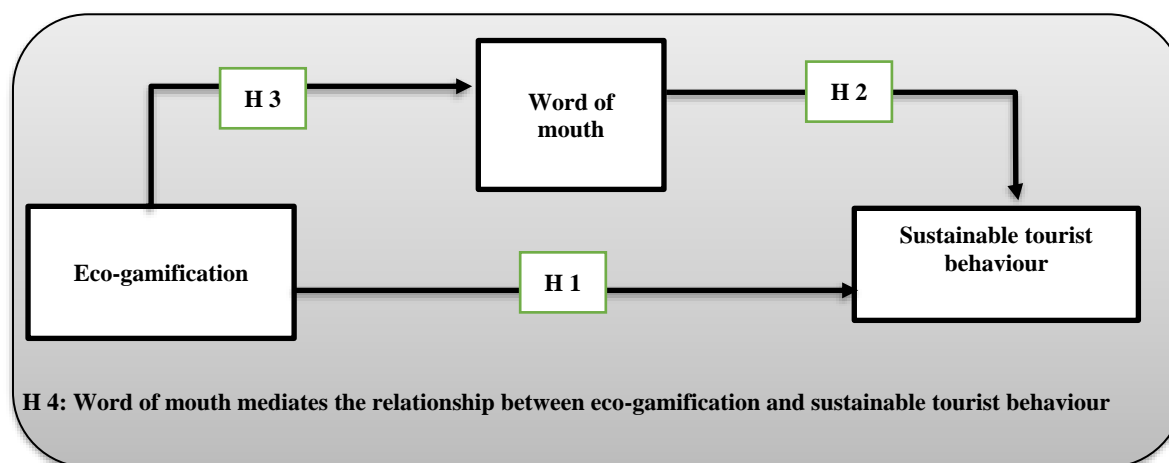


Figure 1: The study model

Methodology

The study population consisted of Arab and foreign tourists who visited various tourist destinations in Egypt, especially those interested in environmental tourism and used environmental games, during the period from December 2023 to January 2024. A purposive sampling approach was used to identify possible respondents. Purposive sampling is a technique in which appropriate conditions, individuals, or events are purposely picked in order to obtain useful data that cannot be obtained by other methods (Taherdoost, 2016; Al-Azab & Zaki, 2023). Moreover, paper-based questionnaires were distributed to the tourists. Only international tourists who had previously travelled, were interested in environmental tourism, and had played environmental games were invited to participate in the study. Among these games was (JouleBug), which is a game that meets all the standards of sustainability and environmental preservation. This game is designed based on a set of challenges and activities related to the environment. The more the player performs a specific activity that achieves sustainability, the more s/he receives certain prizes and badges. A pilot test, including 30 respondents and three academic specialists in environmental tourism and tourism behaviour, was conducted to confirm that the statements of the questionnaire were understood and to examine the reliability of the measures. Following this pretest, some items were refined to be used in the subsequent final questionnaire. To remove common technique bias, the questionnaire was distributed at several tourist attractions in Egypt at varied times throughout the day, similar to prior studies (e.g., Hui et al., 2007). A total of 416 copies were obtained; 344 of them were usable (82.6% response rate), and 72 were invalid. The questionnaire for this study was developed on the basis of previous studies. The instruments for the measurement of eco-gamification were assessed with a fourteen-item scale developed from Aguiar-Castillo et al. (2019). The measures for sustainable behaviour (12 items) were adopted from Carfi and Schiliro (2012) and Li et al. (2022). On the other hand, word of mouth (WOM) measurement (3 items) was based on Aguiar-Castillo et al. (2019). Finally, all these items were assessed on a five-point Likert scale ranging from “strongly agree” to “strongly disagree”.



Results

According to the sample profile (Table 1), 40.1 % of the respondents were in the 25-35 age range, followed by those less than 25 years old (30.8 %). In terms of gender, the proportion of males was 57.8%, and that of females was 42.2%. Those who held a Bachelor's degree were 51.7%, and the majority of them were single (47.7%). In terms of annual income, 27.9% of the participants earned 6000\$ to less than 12000\$, followed by less than 6000\$ (25.6%).

Table 1 The sample's characteristics

Gender	Frequency (n = 344)	%	Education level	Frequency (n = 344)	%
Male	199	57.8	Bachelor's degree	178	51.7
Female	145	42.2	Master's degree	11	3.2
			Doctorate degree	51	14.8
Age	Frequency (n = 344)	%	Other	Frequency (n = 344)	%
Less than 25 years old	106	30.8		104	30.2
25-35 years old	138	40.1	Annual income	Frequency (n = 344)	%
36-45 years old	77	22.4	Less than 6000\$	88	25.6
46-55 years old	16	4.7	6000\$ to less than 12000\$	96	27.9
More than 55 years old	7	2.0	12000\$ to less than 18000\$	67	19.5
Marital status	Frequency (n = 344)	%	18000\$ to less than 20000\$	57	16.6
Married	138	40.1	20000\$ and above	36	10.5
Single	164	47.7			
Divorced	30	8.7			
Other	12	3.5			

To test the hypotheses, the study used Warp pls 7 to apply a regression-based partial least squares Structural Equation Modelling (PLS-SEM). This technique does not assume normality, and it consists of estimating two discrete models: the measurement model (outer model) and the structural model (inner model) (Jarvis et al., 2003). WarpPLS is a derivative of PLS. Hence, the features that apply to PLS also apply to WarpPLS (Solimun et al., 2017). As a result, WarpPLS can be used to confirm the theory (hypothesis testing) as well as to develop models without a theoretical basis (Hidayat & Achmad, 2019). Moreover, PLS-SEM is recommended for three reasons. First, it is useful when the investigation focuses on testing a theoretical framework (Hair et al., 2019). In fact, this research is a first attempt to investigate the impact of eco-gamification on tourist behaviour. The paper expands on this theoretical concept by relating eco-gamification to word of mouth and tourist behaviour, involving theory formation. Second, PLS-SEM is a favored prediction method (Evermann & Tate, 2016). It is a causal-predictive approach to SEM that emphasizes prediction when estimating statistical models with structures intended to provide causal explanations (Sarstedt et al., 2017; Al-Azab & Abulebda, 2023). Third, because the PLS technique does not impose distributional assumptions on the data, it is ideal for complex models with several constructs, indicator variables, and structural routes (Hair et al., 2019). The suggested integrative model consists of three structures, each with a number of components. Due to its intricacy, PLS-SEM was suitable to be adopted in this study. A primary axis factor analysis was used to identify probable common technique bias. The results demonstrated that the prime component accounted for less than half of the variance. Consequently, our dataset was free of the common method bias (Chin et al., 2012). Furthermore, multicollinearity tests revealed that all variables had variance inflation factor (VIF) values lower than 3.20. Model fit was assessed before the hypotheses were tested. As displayed in Table 2, all model fit and quality index values are in agreement with the criterion in the table.

Table 2. Model fit summary

Fit index and model results	Criterion
Average path coefficient (APC)= 0.586, P<0.001	p < 0.05
Average R-squared (ARS)=0.743, P<0.001	p < 0.05
Average adjusted R-squared (AARS)=0.741, P<0.001	p < 0.05
Average full collinearity VIF (AFVIF)= 2.269	Acceptable if ≤ 5, ideally ≤ 3.3
TenenhausGoF (GoF)=0.686	small ≥ 0.1, medium ≥ 0.25, large ≥ 0.36
Simpson's paradox ratio (SPR)=1.000	acceptable if ≥ 0.7, ideally = 1
R-squared contribution ratio (RSCR)=1.000	acceptable if ≥ 0.9, ideally = 1
Statistical suppression ratio (SSR)=1.000	acceptable if ≥ 0.7
Nonlinear bivariate causality direction ratio (NLBCDR)=1.000	acceptable if ≥ 0.7
Standardized root mean squared residual (SRMR)=0.091	acceptable if ≤ 0.1
Standardized mean absolute residual (SMAR)=0.070	acceptable if ≤ 0.1
Standardized chi-squared with 405 degrees of freedom (SChS)=6.594	P<0.001
Standardized threshold difference count ratio (STDSCR)=0.978	acceptable if ≥ 0.7, ideally = 1
Standardized threshold difference sum ratio (STDSCR)=0.904	acceptable if ≥ 0.7, ideally = 1

Measurement model

To evaluate the measurement model, we first investigated its reliability (internal consistency) and convergent validity. In addition, reliability analysis was performed to ensure internal validity and consistency of the items used for each variable (Al-Azab et al., 2021). Thus, factor loadings, composite reliability (CR), Cronbach's alpha, average variance extracted (AVE), and variance inflation factor (VIF) were evaluated. Table 3 shows that composite reliability, Cronbach's alpha, and AVE all meet or surpass the reliability and validity cutoffs of 0.7, 0.7, and 0.5, respectively (Hair et al., 2016). The variance inflation factor (VIF) scores and Harman's single factor test were used to examine multicollinearity and common method bias (Podsakoff et al., 2003). The VIF for all the constructions was less than 5, indicating no significant collinearity. Henseler et al. (2015) suggested a methodology to estimate discriminant validity based on the multitrait-multimethod matrix; it is the heterotrait-monotrait (HTMT) correlation ratio. This unique method has been used to assess discriminant validity, and the results are displayed in Table 4. If the HTMT value exceeds 0.85, discriminant validity is compromised (Kock, 2020). All research constructs have values less than 0.85, demonstrating acceptable discriminant validity.



Table 3. Convergent validity

Constructs	Items	Factor loadings	Cronbach's alpha (CA)	Composite reliability (CR)	AVE	VIF
Eco-gamification (Egami)	Eco-g1	0.737	0.927	0.937	0.585	2.425
	Eco-g2	0.778				
	Eco-g3	0.766				
	Eco-g4	0.782				
	Eco-g5	0.739				
	Eco-g6	0.718				
	Eco-g7	0.733				
	Eco-g8	0.772				
	Eco-g9	0.757				
	Eco-g10	0.777				
	Eco-g11	0.770				
	Eco-g12	0.753				
	Eco-g13	0.842				
	Eco-g14	0.811				
Word of mouth (WOM)	Wom1	0.864	0.834	0.901	0.751	2.384
	Wom2	0.882				
	Wom3	0.854				
Sustainable behaviour (Sbehv)	Sus-b1	0.808	0.947	0.954	0.634	2.283
	Sus-b2	0.862				
	Sus-b3	0.811				
	Sus-b4	0.750				
	Sus-b5	0.822				
	Sus-b6	0.780				
	Sus-b7	0.808				
	Sus-b8	0.822				
	Sus-b9	0.780				
	Sus-b10	0.808				
	Sus-b11	0.709				
	Sus-b12	0.826				

Table 4 Discriminant validity assessed using the Heterotrait-monotrait (HTMT) ratio

Constructs	EG	WOM	SB
EG			
WOM	0.758		
SB	0.679	0.646	

HTMT ratios (good if < 0.90; best if < 0.85)

Note: Egami = Eco-gamification, WOM = Word of mouth, Sbehv = Sustainable behaviour

Structural model

The inner model shows p-values and path coefficients (β) for the relationships hypothesized. As shown in Fig. 2, eco-gamification has a positive and significant relationship with sustainable behaviour ($\beta = 0.46$), and word of mouth ($\beta = 0.85$). Thus, H1 and H2 are supported. Furthermore, the results show that word of mouth ($\beta = 0.45$) has a positive effect on sustainable behaviour. Hence, H3 is supported. Finally, it can be concluded that 72% of the word of mouth is based on eco-gamification. Moreover, the word of mouth explained 77% of the sustainable behaviour.

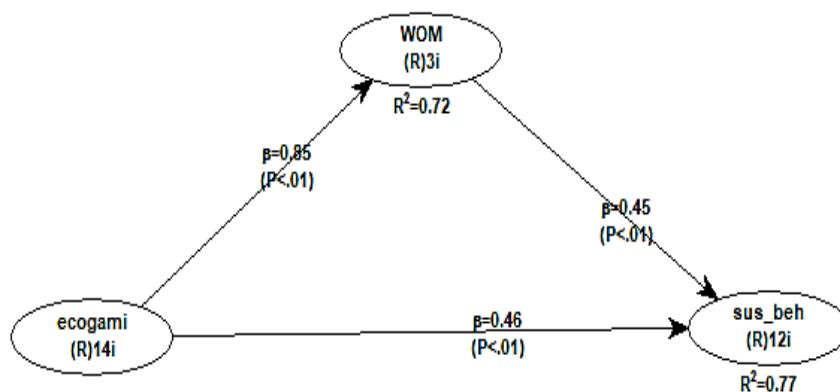


Fig. 2. Path coefficient and p value

As shown in Table 5, indirect effects were assessed to uncover the mediating role of the word of mouth in the association between eco-gamification and sustainable behaviour. The findings show that the word of mouth partially mediates the link between eco-gamification and sustainable behaviour. Thus, H4 is accepted.

Table 5. Results of direct and indirect effects

Path	Direct effect	Significance	Indirect effect via Word of mouth	Significance	Confidence intervals		Outcome
		P value		P value	2.5%	97.5%	
Eco-gamification on sustainable behaviour	0.46	0.001	0.382	0.001	0.229	0.460	Partial mediation



Table 6. Summary of hypothesis testing

Hypothesis	Test
H1. Eco-gamification has a positive effect on sustainable behaviour	Accepted
H2. Eco-gamification has a positive effect on word of mouth	Accepted
H3. Word of mouth has a positive effect on sustainable behaviour	Accepted
H4. Word of mouth mediates the link between eco-gamification and sustainable behaviour	Accepted

Discussion

According to Souza et al. (2020), eco-gamification can be used as a strategy to overcome the challenges that tourism poses for destinations and companies since its application, in light of current technological progress, serves environmental purposes and tourism activities, especially regarding achieving sustainability and enhancing positive tourist behaviour. Moreover, the word of mouth plays a major role in conveying tourist experience (Scurati et al., 2021). The positivity of tourists when trying a specific environmental game changes their behaviour towards the environment. Therefore, the main goal of this research is to explore the mediating role of the spoken word in the relationship between environmental gamification and sustainable tourist behaviour. The results have revealed the presence of positive attitudes by tourists towards environmental gamification. The findings have also shown that the word of mouth (the spoken word) partially mediates the relationship between environmental gamification and sustainable tourist behaviour, since there is a strong direct relationship between the spoken word related to environmental gamification and sustainable tourist behaviour at the tourist destination. This indicates that the spread of the word of mouth regarding environmental gamification significantly positively affects sustainable tourist behaviour at tourist destinations. Additionally, the results have concluded that environmental gamification affects tourist behaviour sustainability at the tourist destinations. It also has an impact on the sub-dimensions emerging from it (the ease of using environmental gamification, advantages achieved from environmental gamification, pleasure achieved from environmental gamification, satisfaction about environmental gamification, and expectations towards the prizes offered in environmental gamification). This has been reflected via the results of the multiple linear regression test, which agrees with the study by Abou Kamar et al. (2023) who have reported a relationship between environmental gamification and achieving sustainability in tourist destinations.

Conclusions

According to the results of the study, eco-gamification positively affects sustainable tourist behaviour. Thus, decision-makers in tourist destinations must use gamification to interact with customers and influence their behaviour by enhancing their tourism experiences, creating shared value, and stimulating internal motivations. This can be also achieved via the word of mouth since the results have proven that environmental gamification has a positive impact on the word of mouth, and the word of mouth positively affects sustainable tourist behaviour and plays the mediating role between eco-gamification and sustainable tourist behaviour. Consequently, it is necessary to strengthen tourists' loyalty through developing interaction between the customer and the gamification system, and between the different users of the same system. In addition, those responsible for tourism marketing in tourist destinations must obtain data and information about current and targeted customers, evaluate the performance of the marketing campaigns, and introduce a gamification system including pictures, videos, and information about the tourist destination to attract tourists. The decision-makers in the destinations must also adopt a gamification strategy as one of the modern technological means in order to support and improve tourists' behaviour. Besides, they can hold workshops for programming and information technology experts and specialists in psychology and sociology to exchange related experiences. Furthermore, it is important to use environmental gamification and its applications to positively influence tourist behaviour, and utilize the word of mouth to raise brand awareness. Moreover, those interested in the environment must create more job opportunities, protect cultural and natural heritage, and stimulate the consumption of local products. This contributes to the development of the four pillars of sustainable tourism (environmental, social, cultural, and economic). It is also required to integrate the characteristics and tools of gamification with the sustainable environment in order to achieve economic and social progress without harming the environment. This can be achieved through encouraging investment in the tourism and environmental fields, and providing support to game development technology on an ongoing basis. Tourists must pay attention to environmental games and modern applications because of their significant influence on their behaviour and on directing them towards sustainability. In addition, tourism companies and organizations must consider using eco-gamification in their operations to promote sustainability and lead positive change, and pay attention to the users' word of mouth about the environmental games because it has a major role in conveying their positive experience to others, which works to shape sustainable behaviour. Finally, eco-gamification can motivate individuals to engage in pro-environmental activities indirectly through tourists' word of mouth about it. Further research studies could be conducted based on the current research where researches can apply other games in the tourism field. They can also investigate to what extent tourists' sustainable behaviour is affected by their nationalities, age, demographic and functional variables. Furthermore, it is possible in future research to increase the sample size, which may lead to reaching different results, as well as linking gamification to other variables such as decision-making and marketing intentions.

Acknowledgement

We are appreciative of the funding provided for this research by the Academy of Scientific Research & Technology (ASRT), as represented by the Scientists for Next Generation Scholarship (ASRT-SNG).



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